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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/603,684	06/26/2003	Mahmoud H. Abd Elhamid	GP-302186	3780
65798 7590 04/19/2007 WARN HOFFMANN MILLER & LALONE, P.C. GENERAL MOTORS CORPORATION P.O. BOX 70098 ROCHESTER HILLS, MI 48307			EXAMINER CANTELMO, GREGG	
			ART UNIT 1745	PAPER NUMBER
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		04/19/2007	PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/603,684

Applicant(s)

ABD ELHAMID ET AL.

Examiner

Gregg Cantelmo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 February 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4, 7-22, 25-33, 48 and 49 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 7-22, 25-33 and 48-49 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on February 8, 2007 has been entered.

Response to Amendment

2. In response to the amendment received February 8, 2007:
- a. Claims 1-4, 7-22, 25-33 and 48-49 are pending;
 - b. The previous prior art rejections stand.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-4, 7-22, 25-33 and 48-49 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. The term "substantial" in claims 1-4, 7-22, 25-33 and 48-49 is a relative term which renders the claims indefinite. The term "substantial" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the

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invention. It is unclear as to what amounts of the claimed particle size of the graphite/conductive material having an original particle size greater than the thickness of the plate constitutes a "substantial portion". The original disclosure fails to use or describe portions which clearly define the term "substantial" thus the term itself is vague and indefinite. Furthermore by reciting the term "substantial portion" for the graphite/conductive material the claims now include two types of graphite/conductive material. That which constitutes the claimed "substantial portion" and the remainder which is not within the claimed "substantial portion". Thus all of the claims directed to further defining "said graphite" or "said conductive material" is unclear as to whether it is directed to the "substantial" portion, remaining "insubstantial" portion or both. Finally the claims are unclear as to when the graphite or conductive material exhibits their original particle size as defined in the claims. Thus the claimed original particle size could be the original particle size of the graphite or conductive material from a stock material used in the process of making the final plate. Thus the original particle sizes as claimed could include intermediate particle sizes but thereafter processed to final particle sizes which do not exhibit the same particle size as their original particle size. Therefore the end product as claimed does not require the original particle sizes as defined therein. Applicant is advised to Clarification is respectfully requested.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-4, 7-13, 16-22, 25-29 and 32-33 are rejected under 35 U.S.C. 102(b) as being anticipated by CA 02391894 (CA '894).

CA '894 discloses a composite separator plate for use in a fuel cell stack of the type having a first surface and a second surface opposite said first surface (Fig. 2), the composite separator plate comprising a polymeric material and expanded graphite dispersed in said polymeric material (abstract, page 13, line 23 through line 12 and page 19, line 22 through page 20, line 6), wherein at least some of said expanded graphite extends from said first surface to said second surface. Notably, CA '894 teaches of using preferred flaky branched-needle-like shapes or dendritic shapes since these particles have many contacting points after molding and result in the electrical conductor materials to be in contact to contribute good conductivity (page 19, ll. 3-15). In thus the conductive expanded graphite particles described therein are expectant to provide conductive pathways which extend from the first surface of the separator to the second surface of the separator (as applied to claims 1 and 18). The expanded graphite is inherently compressible, especially the needle-like flakes or dendritic shapes discussed above (as applied to claim 18).

The claimed particle size and original particle size do not necessarily define the claimed product and thus can be inclusive of an intermediate product particle size or precursor particle size which is not necessarily present nor required in the end separator plate. Thus the original particle size does not exclusively differentiate the

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claimed end product from that of CA '894 since the particle size limitation is not claimed to be required in the end product.

Thus the product of CA '894 still anticipates the claimed product and this rejection stands.

The expanded graphite comprises between about 10% and about 50% by volume, and further about 35% by volume (page 25, ll. 3-10 as applied to claims 2, 3, 19 and 20).

The compressible material comprises expanded graphite (as discussed above and applied to claim 21).

The expanded graphite is in particle sizes of between about 0.1-1mm (page 16, ll. 6-24 as applied to claims 4 and 22).

The polymeric material is selected from the group consisting of thermoset and thermoplastic polymers (page 19, ll. 22-25 as applied to claims 7 and 25).

The polymeric material is selected from the group consisting of: epoxy, polyvinyl ester, polyester, polypropylene, and polyvinylidene fluoride (page 19, ll. 22-35 as applied to claims 8 and 26).

The expanded graphite is inherently compressible, especially the needle-like flakes or dendritic shapes discussed above. Furthermore, the expanded graphite has an inherent degree of compression relative to the amount of force exerted on the sheet. Note that the claims fail to specify any value or range of values for the extent of the compression and thus can be any degree of compression (as applied to claim 9).

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In addition, the voids where the resin is present is construed to be equivalent to the pores present in the graphite material (as applied to claim 10). Note that the end product is not porous else it would not effectively function as a separator.

In a further embodiment the separator comprises expanded graphite and a fibrous material in the polymer matrix (page 32, ll. 1-2). The fibrous material is construed to be a filler (as applied to claims 11 and 27).

The fibers are carbon fibers (page 32, ll. 1-13 as applied to claims 12 and 28).

With respect to the properties of claims 13, 16, 17, 29, 32 and 33:

Where applicant claims a composition in terms of a function, property or characteristic and the composition of the prior art is the same as that of the claim but the function is not explicitly disclosed by the reference, the examiner may make a rejection under both 35 U.S.C. 102 and 103, expressed as a 102/103 rejection.

The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. In re Rijckaert, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993).

"In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." Ex parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990)

In the case of the instant application the basis for expectation of inherency is that since CA '894 teaches of using the same expanded graphite in the same resin and both are used as a conductive sheet, there is a reasonable expectation that composite

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separators of CA '894 would inherently exhibit the same claimed permeation and specific resistance requirements, absent clear evidence to the contrary (as applied to claims 13, 16, 17, 29, 32 and 33). Furthermore it is evident that the prior art separators exhibit the same specific resistance as claimed (see Examples 1, 3-5, 7, 8, 11, 12, 20-24, 33 and 34).

The Examiner requires applicant to provide that that the prior art products do not necessarily or inherently possess the characteristics of his [or her] claimed product.

Whether the rejection is based on inherency' under 35 U.S.C. 102, on prima facie obviousness' under 35 U.S.C. 103, jointly or alternatively, the burden of proof is the same...[footnote omitted]." The burden of proof is similar to that required with respect to product-by-process claims. In re Fitzgerald, 619 F.2d 67, 70, 205 USPQ 594, 596 (CCPA 1980) (quoting In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433-34 (CCPA 1977)).

Response to Arguments

6. Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

The claimed particle size and original particle size do not necessarily define the claimed product and thus can be inclusive of an intermediate product particle size or precursor particle size which is not necessarily present nor required in the end separator plate. Thus the original particle size does not exclusively differentiate the claimed end product from that of CA '894 since the particle size limitation is not claimed to be required in the end product.

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Thus the product of CA '894 still anticipates the claimed product and this rejection stands.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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7. Claims 14, 15, 30 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over CA '894 in view of either JP 05-182679 (JP '679) or JP 62-272465 (JP '465).

The teachings of CA '894 have been discussed above and are incorporated herein.

The differences between claims 14-15 and 30-31 and CA '894 does not teach of the conductive layer disposed over the separator (claims 14 and 30) or of the conductive layer material being selected from the group consisting of gold, silver, platinum, carbon, palladium, rhodium and ruthenium.

According to JP '679: A fuel cell has an electrolyte film, positive electrode and a negative electrode 20 in both sides of the film, collector 30 in the outside of the electrode 20 and a collector terminal 40 brought into contact with this collector as a single cell. Here, a surface of the collector 3 consisting of porous carbon sintered material or the like is coated with a metal of platinum, gold, iridium, etc., excellent in conductivity and corrosion resistance to about 0.05 to 2 μ m by a sputtering method or the like. In this way, a sum of contact resistances between the collector 30 and the terminal 40 and between the collector and an electrode and resistance of the collector 30 itself is reduced to about 1/2. Since a metal is advanced into an interface of the collector and a catalytic layer, also hydrogen adsorbing power is improved.

JP '465 teaches providing an expanded graphite outer layer to a carbon based separator. Expanded graphite is a particular carbon product (abstract).

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The motivation for providing a metal film on the outer surface of the composite separator is to reduce the contact resistance of the components.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of CA '894 by providing a metal film on the outer surface of the composite separator since it would have reduced the contact resistance of the separator.

8. Claims 48 and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over CA '894.

The teachings of CA '894 have been discussed above and are incorporated herein.

The difference between CA '894 and claims 48 and 49 is that CA '894 does not teach of the require relationship between the plate thickness and e-graphite particle size.

CA '894 discloses a variety of particle sizes and plate thicknesses at least some of the combinations held to render the claimed relationship obvious.

For example, CA '894 teaches of the advantages of using needle-like flakes or dendritic shapes for the e-graphite, as discussed above. CA '894 teaches that the average particle size is about 250 microns (page). Furthermore CA '894 teaches that the plate has a thickness for section B which is from 0.25-2mm and preferably 0.25 to 1 mm (page 31, ll. 9-16). The suggested combination above renders particle sizes of 250 microns or 0.25mm which when disposed in portion B of the separator would arrive at

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the claimed proportion of the particle size of claims 48 and 49 relative to the plate thickness at sections B.

Thus while not expressly teaching of the specific relationship recited in claims 48 and 49, at least some of the combination of dimensions of CA '894 would obviously result in graphite particle sizes which are greater than 10% of the thickness of portions of the separator plate. Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969). It has been held that when the difference between a claimed invention and the prior art is the range or value of a particular variable, then a prima facie rejection is properly established when the difference in the range or value is minor. Titanium Metals Corp. of Am. v. Banner, 778 F.2d 775, 783, 227 USPQ 773, 779 (Fed. Cir. 1985).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregg Cantelmo whose telephone number is 571-272-1283. The examiner can normally be reached on Monday to Thursday, 8:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

A handwritten signature in black ink, appearing to read "Gregg Cantelmo". The signature is fluid and cursive, with the first name "Gregg" and last name "Cantelmo" clearly distinguishable.

gc
April 16, 2007

Gregg Cantelmo
Primary Examiner
Art Unit 1745